



Course Syllabus: Advanced Inorganic Chemistry II - ChemS 350

Division	Physical Science and Engineering Division
Course Number	ChemS 350
Course Title	Advanced Inorganic Chemistry II
Academic Semester	Spring
Academic Year	2016/2017
Semester Start Date	01/22/2017
Semester End Date	05/18/2017
Class Schedule (Days & Time)	09:00 AM - 10:30 AM Sun Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Jean-Marie Maurice Basset	jeanmarie.basset@kaust.edu.sa	+966128080299	4234, 3, Ibn Sina (bldg. 3)	<p>In the office every weekday from 9 to 12 and 2 to 6 pm</p> <p>Any appointment needed please contact my secretary: Nathalie Gregoire 012/8080763 or mail: nathalie.gregoire@kaust.edu.sa</p> <p>Jean-Marie Basset Director of KAUST CATALYSIS CENTER (KCC) Distinguished Professor of Chemical Sciences KAUST Catalysis Research Center (KCC) King Abdullah University of Science and Technology Bld. 3, level 4, r-4234, PO Box 4700, Thuwal, 23955-6900, KSA</p>

Teaching Assistant(s)	
Name	Email

Course Information

Comprehensive Course Description	<ol style="list-style-type: none"> 1. General Objectives of the course 2. 18 electrons rule, pi bonding 3. Sigma bonding 4. Organometallic chemistry and catalysis: Ligands 5. Elementary steps in catalysis: oxidative addition/reductive elimination 6. Elementary steps in catalysis : sigma bond metathesis 7. Elementary steps in catalysis: Insertions reactions, beta elimination 8. Short introduction to catalytic cycle 9. Homogeneous catalysis: Carbonylation 10. Homogeneous catalysis : Hydroformylation 11. Homogeneous catalysis: Monoelectronic transfer 12. Polymerization: olefins, dienes,... 13. Heterogeneous catalysis: the various classes of catalysts 14. Heterogeneous catalysis: the flue gas depollution 15. Heterogeneous Catalysis: Energy and CO₂ 16. Heterogeneous Catalysis: Deactivation and regeneration 17. Heterogeneous catalysis: Refining technology
Course Description from Program Guide	Emphasis on concepts and applications of homogenous and heterogeneous catalysis and the impact of such processes on the advancement of different industries.
Goals and Objectives	UNDERSTAND HOMOGENEOUS AND HETEROGENEOUS CATALYSIS FROM A MECHANISTIC STAND POINT OF VIEW IN PRINCIPLE AT THE END OF THIS COURSE THE STUDENTS ARE ABLE TO TAKLE ANY CHEMICAL REACTION.
Required Knowledge	BASIC KNOWLEDGE OF CHEMICAL BONDING
Reference Texts	<p><u>Books:</u></p> <p>1. James P. Collman (Author), Richard G. Finke (Author), Jack R. Norton (Author) Principles and Applications of Organotransition Metal Chemistry [James P. Collman, Richard G. Finke, Jack R. Norton] on Amazon.com.(1987)</p> <p>-Elschenbroich & A. salzer « Organometallics » Iled, VCH 1992</p> <p>-Gadi Rothenberg « Catalysis », VCH (2008)</p> <p>-Piet W. N.M. Van Leeuwen « Homogeneous Catalysis », Kluwer (2004)</p> <p>-Hans Niemanstvedriet, “Spectroscopy in Catalysis” Wiley –VCH (2007)</p> <p><u>Journals:</u></p> <ol style="list-style-type: none"> 1. Journal of Organometallic Chemistry 2. Journal of Catalysis 3. Organometallics 4. ACS catalysis 5. ChemCatChem 6. Am. Chem. Soc. 7. Chem. Intern. Ed. 8. Phys. Chem. 9. Science 10. Cat.
Method of evaluation	100.00% - Final exam
Nature of the assignments	RECOMMENDED TEXTBOOK: Didier Astruc “Organometallic Chemistry”
Course Policies	HOMEWORK: Special topic reading assignments EXAMS: Final: May 2017 (individual projects – report and oral exam): 100% No make-up exams will be provided.

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Sun 01/22/2017 Wed 01/25/2017	no class
2	Sun 01/29/2017 Wed 02/01/2017	1. General Objectives of the course 2. 18 electrons rule, pi bonding
3	Sun 02/05/2017 Wed 02/08/2017	Sigma bonding Organometallic chemistry and catalysis: Ligand
4	Sun 02/12/2017 Wed 02/15/2017	Elementary steps in catalysis : sigma bond metathesis
5	Sun 02/19/2017 Wed 02/22/2017	Elementary steps in catalysis: Insertions reactions, beta elimination
6	Sun 02/26/2017 Wed 03/01/2017	Short introduction to catalytic cycle
7	Sun 03/05/2017 Wed 03/08/2017	Homogeneous catalysis: Carbonylation
8	Sun 03/12/2017 Wed 03/15/2017	Homogeneous catalysis : Hydroformylation
9	Sun 03/19/2017 Wed 03/22/2017	Homogeneous catalysis: Monoelectronic transfer
10	Sun 03/26/2017 Wed 03/29/2017	Polymerization: olefins, dienes,...
11	Sun 04/02/2017 Wed 04/05/2017	Heterogeneous catalysis: the various classes of catalysts
12	Sun 04/09/2017 Wed 04/12/2017	Heterogeneous catalysis: the flue gas depollution
13	Sun 04/16/2017 Wed 04/19/2017	Heterogeneous Catalysis: Energy and CO ₂
14	Sun 04/23/2017 Wed 04/26/2017	Heterogeneous Catalysis: Deactivation and regeneration
15	Sun 04/30/2017 Wed 05/03/2017	Heterogeneous catalysis: Refining technology
16	Sun 05/07/2017 Wed 05/10/2017	Heterogeneous catalysis:
17	Sun 05/14/2017 Wed 05/17/2017	Heterogeneous catalysis: Refining technology
18		Heterogeneous catalysis:

Note

The instructor reserves the right to make changes to this syllabus as necessary.